SYSTEM AND METHOD FOR PDA TO PDA COMMUNICATION USING A NETWORK PORTAL

Field of the Invention

The present invention relates to portable electronic device communications and in particular to the transfer of information from one portable electronic device to another.

Background of the Invention

Portable electronic devices such as personal digital assistants (PDAs) are commonly used for personal record keeping such as appointments, contacts, expenses and other information. In many instances, it is desirable to transfer information from one portable electronic device to another.

Many portable electronic devices include an infrared (IR) interface for communication with compatible devices, including other portable electronic devices. Thus, these portable electronic devices are operable to send or "beam" information to another device using, for example IrDA, which is a well known protocol using infrared light pulses for data transfer.

IrDA communication suffers from the disadvantage that it is designed for "face to face" transfer of information and is limited to communications within a three-meter line-of-sight range. While this may be acceptable for "face to face" data exchange, the three-meter range is very limiting. When two portable electronic devices cannot be moved within a three-meter line-of-sight range of each other, IrDA communication cannot be effected between the two devices.

Quite apart from portable electronic devices such as PDAs, integrated networks are also known in the art for providing converged voice and data communications using TCP/IP protocol, over Local Area Networks (LANs) and Wide Area Networks

(WANs). One such system, the Mitel Networks 3300 Integrated Communications Platform (ICP) delivers sophisticated call management, applications and desktop solutions, including the ability for a PDA user to communicate to a telephone device (i.e. IP telephone) for the control of call functions. In this case, the telephone device acts as a network portal for passing information such as digits from the PDA's phonebook or contacts database to call control software on the network. From the user's perspective, the PDA controls the telephone device. The PDA communicates with the network via (1) the IrDA interface between the PDA and the telephone device and (2) TCP/IP communication between the telephone device and the network.

It is an object of an aspect of the present invention to extend the known PDA communication functionality of such networks to provide an improved method of communication for portable electronic devices, such as PDAs, over a network.

Summary of the Invention

Therefore, in accordance with an aspect of the present invention there is provided a method and apparatus for allowing two PDAs to "beam" files to one another using a network portal, without the three-meter restriction set forth above. More particularly, a signal path is established between the PDAs via a voice call over a voice communication network. In operation, a first PDA user calls a second PDA user over the voice network to establish the voice call. Then, the voice call path is used to beam files between the two PDAs.

Advantageously, files can be transferred between PDAs by creating a communications path first. The communications path is created by establishing a voice call. Next, data is exchanged between the PDAs. Thus, the files are transferred without the need for any central resource to manage addresses, ensuring efficient use of processing resources.

Brief Description of the Drawings

The invention will be better understood with reference to the drawings, and following description, in which:

Fig. 1 is a block diagram showing an exemplary system for PDA to PDA communication using a network portal, according to the present invention;

Figure 2 is a message flow diagram showing call establishment for the system of Figure 1;

Figure 3 is a message flow diagram showing buffered PDA to PDA beaming of data for the system of Figure 1;

Figure 4 is a message flow diagram showing non-buffered PDA to PDA beaming of data for the system of Figure 1; and

Figure 5 is a message flow diagram showing server-mediated PDA to PDA beaming of data according to an alternative embodiment of the invention.

Detailed Description of Preferred and Alternative Embodiments

As shown in Figure 1, an exemplary embodiment of the system according to the present invention comprises two network portals 1 and 3 (e.g. Mitel Network Portal IP telephony devices) connected to respective ICPs 5 and 6 (e.g. Mitel Networks 3100 Integrated Communications Platform). For purposes of illustration, only a single telephony device or network portal is shown connected to each ICP whereas, in fact, there would normally be multiple such devices. Each network portal 1 and 3 supports the IrDA protocol to receive dialing commands from respective PDAs 7 and 9 using OBEX (Object Exchange), which is an application layer at the top of the IrDA protocol stack. Details of this PDA/telephony communication are set forth in Canadian Patent Application No. 2,369383, filed January 25, 2002 and published July 27, 2002.

While the present description is directed to IrDA protocol mechanisms, it will be understood that the present invention is not limited to IrDA protocol and other wireless protocols such as Bluetooth or 802.11, are also possible between phone and mobile device.

The IrDA protocol works on a master/slave basis whereby communications are sent between two devices (such as PDAs 7 and 9). According to the present invention, each network portal 1 and 3 acts as a proxy on behalf of the associated PDA.

LAN A, LAN B and the WAN provide QoS networking/routing in a well known manner, and have no real bearing on the present invention.

With reference to Figure 2, the user of PDA 7 (referred to hereinafter as the Originator) first places a voice call to the user of PDA 9 (referred to hereinafter as the Destination). Once the call is established, voice communication is effected over IP (RTP/UDP) across LANs A and B and the WAN, between the user's telephony devices 1 and 3.

As shown in Figure 3, when the Originator initiates an object exchange, the network portal 1 accepts the connection on behalf of the Destination. The network portals 1 and 3 at either end communicate their capabilities (mainly, whether they support IrDA transfers). If this is not acknowledged at both ends, PDA to PDA transfer is refused (e.g. a message is displayed on the network portals 1 and 3 and the IrDA connection is closed). Thus, IrDA handshaking determines the capabilities of both devices and establishes the master/slave (primary/secondary in IrDA terms) roles.

When the network portal 1 recognizes an incoming IrDA exchange, a TCP socket is opened to the Destination's network portal 3. The Originator PDA 7 attempts to establish communication to PDA 9 by taking on the role of master (primary) and initiates handshaking with the Destination's PDA 9.

Once connections at both ends have been established and acknowledged, the object is sent by the Originator's PDA 7 (i.e. beaming a file) within the range for a local IrDA exchange, to the Originator's network portal 1. The network portal 1 uses the secondary role of the IrDA stack to handshake with the PDA 7 (exchange IR capabilities for speed, timeouts, etc...). When handshaking completes, the PDA 7 sends the object to the network portal 1 where it is cached. The network portal 1 and PDA 7 then disconnect with a success message.

The Originator's network portal 1 then makes a socket call to the Destination's network portal 3 on a predetermined listening port. Both network portals acknowledge the pending IrDA exchange. The object(s) are packetized by the network portal 1 and then transferred to the Destination's network portal 3 over LAN A, the WAN and LAN B.

When the Destination network portal 3 receives the complete file it uses the primary role of the IrDA stack to detect and initiate handshaking with the Destination's PDA 9. If the PDA 9 is detected, the file is beamed to the PDA 9 and an acknowledgment is returned to the Originating network portal's display during the socket closure.

In some environments, it is possible that the network portal 1 of the preferred embodiment may have insufficient memory to buffer a file before it is sent to the Destination. In such instances, the object can be streamed to the Destination PDA 9 while being received at the Originator's network portal 1.

For example, in the alternative embodiment of Figure 4, the Originator's network portal 1 "stalls" the Originator's PDA 7 by using empty IrDA retransmission frames until the acknowledgement from the Destination network portal 3 that a PDA 9 exists and is connected. As soon as this acknowledgement is received, each subsequently received IrDA frame is transmitted immediately to the Destination network portal 3 and beamed to the PDA 9. Error messages that are within the higher stack layers are returned to the Originator's network portal 1 for re-sending by the PDA 7.

Once the transfer is complete, an acknowledgment is returned to the Originating network portal's display during the socket closure.

For IrDA to operate smoothly without timeout problems, it is necessary for the network portals to "buffer" the incoming request while trying to establish the destination link. Thus, with reference to the alternative embodiment of Figure 5, server mediated transfers can be conducted via a server 11 or "mediator" for accepting, buffering and relaying the object on behalf of either network portal 1 or 3.

During the exchange of IrDA capabilities between the two network portals 1 and 3, the IP address of the mediator 11 is provided by the network portal 1 or 3 that cannot support buffered or streamed data. If both network portals report a mediator, the IP of the mediator from the network portal that originated the voice call is chosen.

In the embodiment of Figure 5, both the Originator and Destination communicate only with the mediator 11. The Originator's network portal 1 transmits the entire file to the mediator 11 which, once the file is received successfully, then relays the file to the Destination network portal 3. Once the Destination network portal 3 successfully delivers the file to the Destination PDA 9, a message is displayed on the Originating network portal 1.

While the embodiments discussed herein are directed to particular implementations of the present invention, it will be apparent that additional variations and modifications to these embodiments are within the scope of the invention as defined solely by the claims appended hereto.